

REMARKS

Reconsideration of the application, as amended, is respectfully requested.

A. Status of the claims

Claim 76 has been cancelled without prejudice to the filing of continuation applications. Claims 82-84 have been amended to further clarify the invention. The specification has been amended to include a definition of nanoparticles. Support for this amendment can be found in Applicant's U.S. Patent No. 6,767,702 (U.S.S.N. 09/760,500), at col. 20, lines 48-52. This document was incorporated by reference into Applicants' present application. See specification, page 6, line 5 and lines 8-9. Claims 37-43, 45-71, 73-75, and 77-85 remain pending. No new matter has been introduced into this application as a result of the present amendment.

B. Priority Claim

The Examiner asserts that the priority dates for claims 37-43, 45-71 and 73-85 can only extend to the filing date of the application, December 28, 2001. Specifically, the Examiner asserts that the provisional application does not provide support for magnetic cores and mean diameter of 5-150 nm. Applicants respectfully traverse this assertion.

The provisional application 60/293,861, filed May 25, 2001 discloses the synthesis of composite coreshell nanocrystals. See provisional application, abstract. An ordinary skilled artisan would understand from the teachings of the specification that nanocrystals refers to particles in the nanometer range. The provisional application also discloses and recognizes the broad utility of the claimed core/shell nanoparticle conjugates. This utility includes the tailorability of the physical properties of the core/shell nanoparticles through the use of a variety of biomolecules and nanoparticle cores that can be chosen depending on the particular desired properties, as disclosed, for example, on the last page of the specification. Thus, Applicants respectfully assert that the entirety of the claims are entitled to the filing date (May 25, 2001) of the provisional application.

C. Claim Objections

Claims 41 and 76 were objected to as being of improper dependent form. The Examiner indicated that 41 does not further limit claim 40 since it is drawn to a method of determining the thickness of the gold shell. However, the Examiner has not cited any authority to support the assertion that such a claim is improper. Indeed, the courts have disagreed with positions analogous to the Examiner's and will allow, for example, product-by-process claims which depend upon independent composition of matter claims. See Leutzing v. Ladd, 222 F. Supp. 681, 683 (D. D.C. 1963).

In the Leutzing application, independent claim 1 claimed the composition of a waxy stick used for filling small cavities, while dependent claim 7 described a particular process for making the stick. Id. at 681. The Examiner rejected dependent claim 7 as being improper since it defined the composite stick in terms of its process of manufacture. Though the Board of Appeals affirmed the rejection, the district court overturned the rejection. The court stated that claim 1 was "generic to the composite stick, however formed," while claim 7 was "limited to sticks in which the blend of materials is heated to 200 degrees F. and held at that temperature for four to nine days." Id. at 683. The court consequently found dependent claim 7 to be properly claimed subject matter directed to a specific process of making the stick. Id. For analogous reasons to the Leutzing case, claim 41 of the instant application is a proper dependent claim. Accordingly, withdrawal of the objection to claim 41 is in order and is respectfully requested. Claim 76 has been cancelled, thus the objection to this claim is now moot.

D. Claim Rejection Under 35 U.S.C. § 112, First Paragraph

Claims 37-43, 45-71 and 73-85 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In particular, the Examiner contends that the limitation "the core/shell nanoparticle having a mean diameter ranging from 5 to 150 nm" is not supported by the specification or claims as originally filed. Applicants respectfully submit that the rejection is overcome by the present amendment to the specification.

The specification has been amended to explicitly recite the 5 to 150 nm size range. Support for this amendment can be found in Applicants' U.S. Patent 6,767,702 at col. 20, lines 48-52, which was incorporated by reference into the present application (see specification, page 6, line 5 and lines 8-9). The claimed size range is therefore fully supported in the specification. Reconsideration and withdrawal of the § 112 rejection is respectfully requested.

E. Claim Rejection Under 35 U.S.C. § 112, Second Paragraph

Claims 82-84 stand rejected under § 112, second paragraph, as being indefinite. Applicants respectfully submit that the rejection is overcome by the present amendment of claim 82. Withdrawal of the rejection is therefore respectfully requested.

F. Claim interpretation

The Examiner interprets nanoparticles as a particle of any size, absent an express definition in the specification. Applicants submit that in view of the present amendment of the specification (discussed above), as well as in view of the specification's general teachings concerning nanoparticles, that nanoparticles of the invention have a preferred size range of from 5 to about 150 nm (mean diameter).

G. Claim Rejections under 35 USC § 103(a)

Claims 37-41, 43, 45-54, 69-71, 73 and 75-84 stand rejected under 35 U.S.C. § 103(a), allegedly as unpatentable over Abbott et al. (US 6,277,489; "Abbott"), Mirkin et al. (US 6,361,944; "Mirkin"), and Yguerabide et al. (Anal. Biochem., 262, 157-76 (1998); "Yguerabide"). The Examiner contends that Abbott teaches a multilayered material comprising a particulate substrate, a metal film layered onto the substrate, and a recognition moiety attached to the metal layer. Further, the particulate substrate is alleged to be any size or material. Mirkin is cited as teaching magnetic particles and particles of 13 nm size, as well as teaching nanoparticle-oligonucleotide conjugates in hybridization methods, and methods for detection on a surface. Yguerabide is cited as allegedly teaching the use of sub-microscopic light-scattering particles as labels in clinical and biological

applications. Based on these reference, the Examiner concludes that it would have been *prima facie* obvious to have used nanoparticles of different sizes of Yguerabide in methods of DNA detection by nanoparticle oligonucleotide conjugates of Abbott and Mirkin. The Applicants respectfully traverse the rejection.

The Federal Circuit reiterated the manner in which obviousness rejections are to be reviewed. Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, "a proper analysis under § 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success." *In re Vaeck*, 947 F.2d 488, 493, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991), citing *In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 U.S.P.Q. 2d 1529, 1531 (Fed. Cir. 1988). Applicants respectfully submit that the combination of Abbott, Mirkin and Yguerabide does not teach or suggest the Applicants' invention as presently claimed.

The presently claimed invention relates to core/shell nanoparticle conjugates having (a) a magnetic core and a non-alloying gold shell surrounding the core and (b) oligonucleotides bound to the gold shell (see, e.g., claim 37); a method for preparing such conjugates (see, e.g., claim 55) and methods for using the conjugates (see, e.g., claim 69). The core/shell nanoparticles of the claimed invention have a mean diameter ranging from 5 to 150 nm.

Abbott describes micrometer-sized silica particles coated with polycrystalline metal films useful as synthesis supports, purification methods, and assays. Abbott, col. 3, line 65 to col. 4, line 6. Abbott's particles have a size range of 1 micrometer (1000 nanometers) to 1000 micrometers (1,000,000 nanometers), with preferred diameters being 50 micrometer (50,000 nanometer) to 500 micrometer (500,000 nanometer). Abbott, col. 9, line 67 to col. 10, line 3. Purification methods for which Abbott's particles are said to be useful include size exclusion chromatography and affinity chromatography. See Abbott, title, and col. 3, lines 12-13.

Abbott does not teach or suggest core/shell nanoparticles of 5 to 150 nm mean diameter, methods of their preparation or methods of their use. As noted above, one use of

Abbott's particles range in size between 1 micrometer and 1000 micrometer, and one of their uses is as chromatography supports.

The Examiner contends that it would have been obvious to use Yguerabide's or Mirkin's nanoparticles in Abbott. The motivation to do so, according to the Examiner, is Yguerabide's teachings of the light producing powers of nanometer sized particles. Applicants respectfully submit, however, neither Yguerabide nor Mirkin remedy the deficiencies of Abbott. There is nothing in Yguerabide or Mirkin that would motivate a skilled person to reduce the size of Abbott's particles, used as chromatography supports, by an order of magnitude or more. Indeed, it is not at all clear that Abbott's particles would continue to function as chromatography supports if their size was reduced to this extent (see Abbott, col. 30, line 41 to col. 31, line 26; describing how size exclusion chromatography functions). Thus, the Examiner's position that a skilled artisan would modify Abbott's micrometer sized chromatography supports by an order of magnitude is unreasonable. Such a modification would likely destroy the function of Abbott's particles.

For at least the foregoing reasons, it is respectfully submitted that all of the pending claims are patentable over Abbott in combination with Mirkin or Yguerabide. Withdrawal of the § 103 rejection is respectfully requested.

H. Allowability of Claims 42, 55-68, 74 and 85

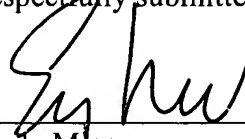
In the Office Action, the Examiner indicated that no references were found teaching or suggesting the invention of the above claims, but that they were nevertheless rejected for reasons given earlier. Applicants respectfully submit that all grounds for rejection of claims 42, 55-68, 74 and 85 have now been removed. Prompt allowance of these claims is therefore respectfully requested.

I. Conclusion

In light of the above arguments, the Examiner is respectfully requested to reconsider the application as claimed. If the Examiner believes that a telephonic or

personal interview would expedite prosecution of the application, she is invited to contact the undersigned at (312) 913-0001.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Emily Miao', written over a horizontal line.

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